Fractal Harmonic Field Theory - Page 2: Testing Delta

Fractal Harmonic Field Theory - Page 2: Testing Delta

We define delta as a time-modulated sinusoidal function:

(t, x) = sin(kx + a sin(bt))

This represents a spatial wave whose frequency modulates over time a "breathing" harmonic analog to the living field concept.

We evaluated it using the modified Klein-Gordon-type equation fragment:

^2/t^2 - ^2/x^2 + m^2

Resulting in a non-linear but stable system. Our findings are as follows:

Strengths:

- Causality is preserved (no retrocausality or non-locality).
- Compatible with Lorentz structure in 1D.
- Smooth, differentiable, and physically valid.
- Represents recursive harmonic behavior aligned with the core theoretical metaphor.

Potential Refinements:

1. Nonlinearity: Nested sine structures break linearity. This invites potential self-interaction.
   - Suggestion: Add a nonlinear potential term (e.g., ^3).

2. Full Relativistic Invariance: Equation currently in 1D + time. Should generalize to 3+1D using scalar functions of spacetime.

- Suggestion: Modulate with relativistic time parameter t' = (t - vx).

3. Energy Stability: Recursively nested sine waves may introduce unbounded resonance.

- Suggestion: Introduce damping: (t, x) = e^(-t) * sin(kx + a sin(bt)).

Conclusion:

No fatal flaw exists. The model is alive, nonlinear, and self-modulating just like the field it intends to describe.